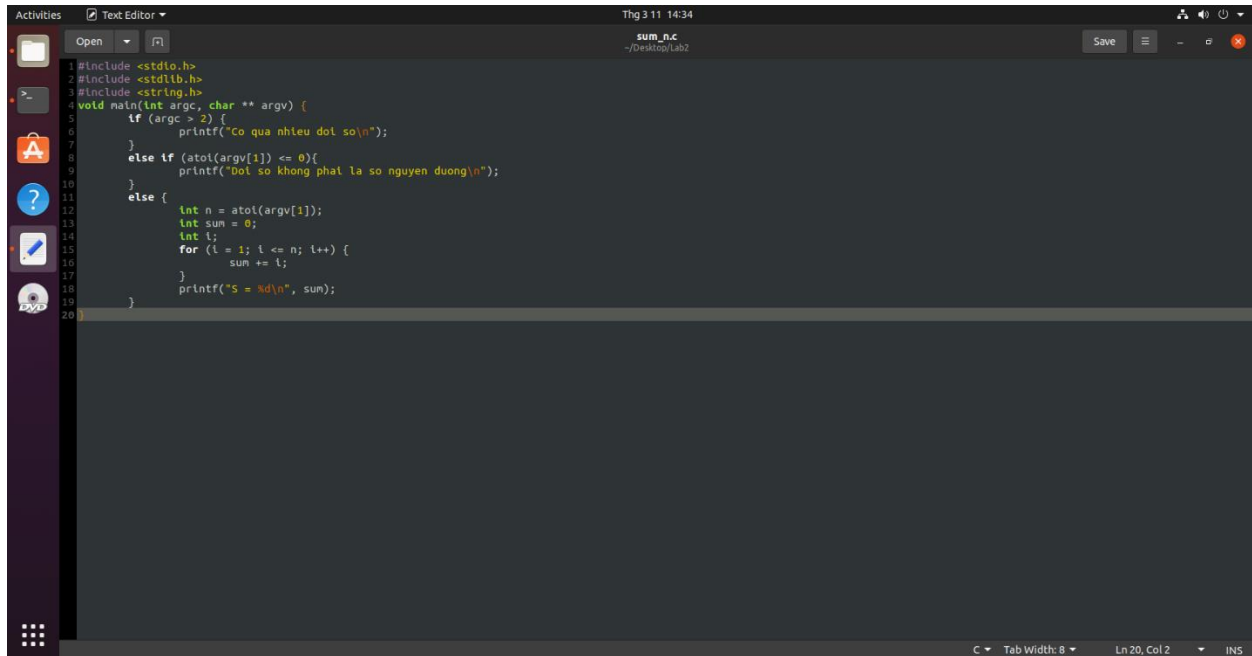


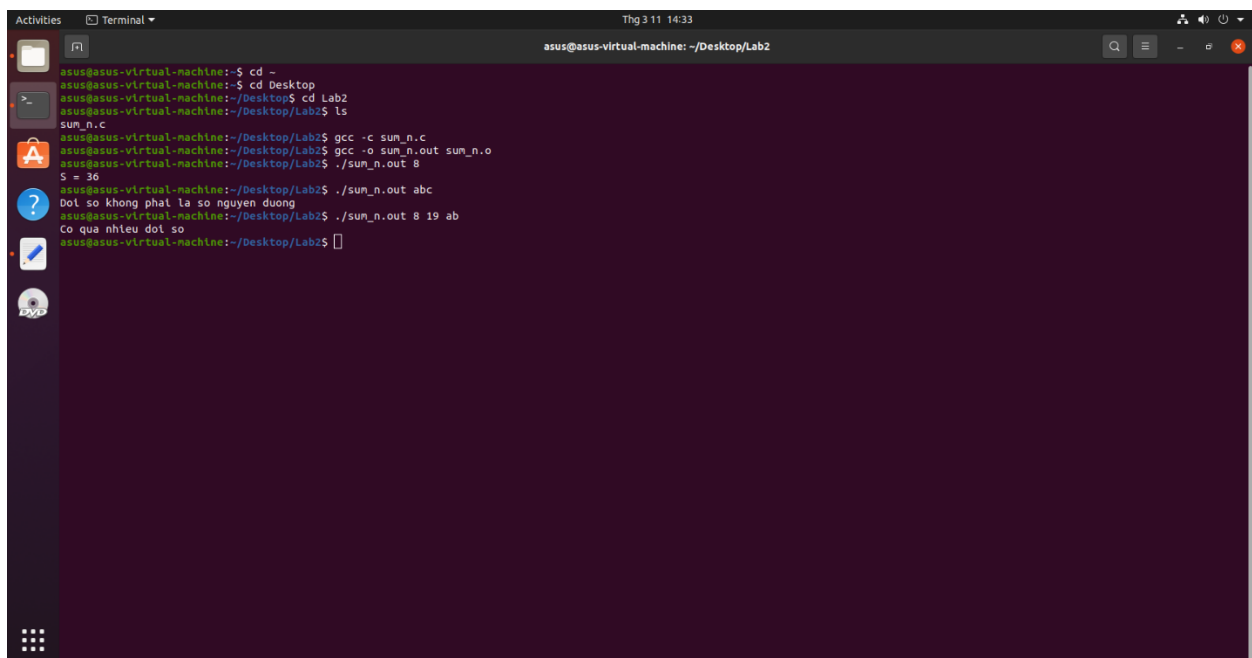
LAB 2

2.2 - Truyền đối số qua lời gọi

Bài 1:

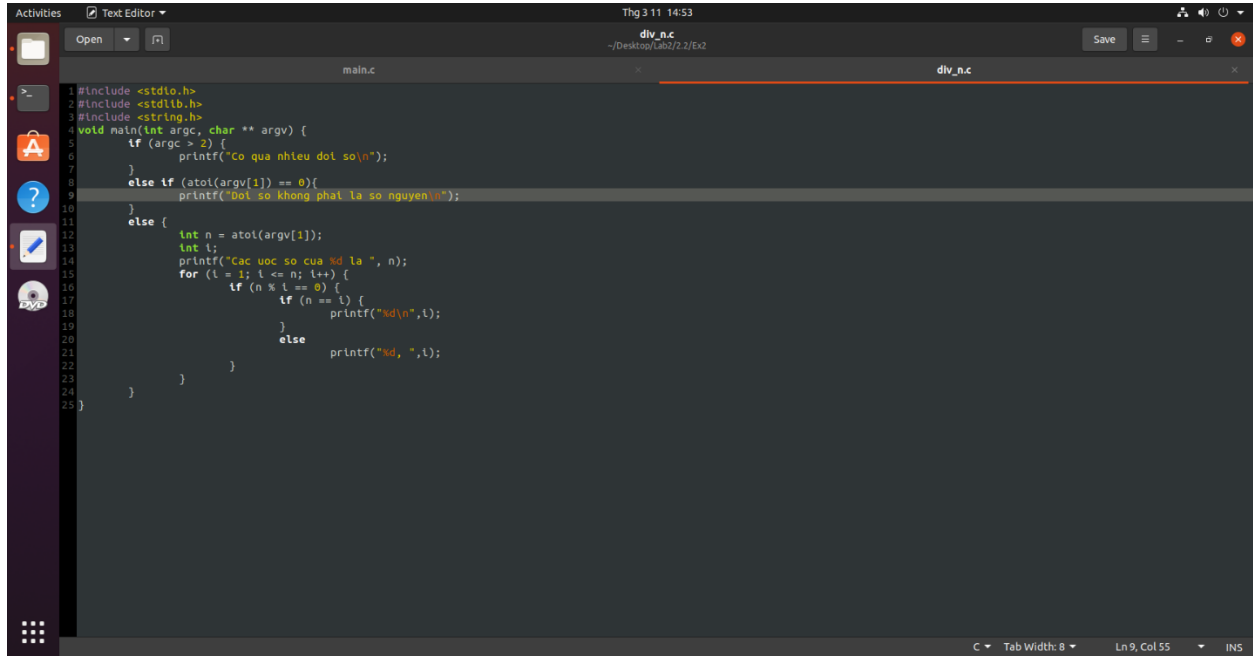


```
1#include <stdio.h>
2#include <stdlib.h>
3#include <string.h>
4
5void main(int argc, char ** argv) {
6    if (argc > 2) {
7        printf("Co qua nhieu doi so\n");
8    }
9    else if (atoi(argv[1]) <= 0) {
10        printf("Doi so khong phai la so nguyen duong\n");
11    }
12    else {
13        int n = atoi(argv[1]);
14        int sum = 0;
15        for (i = 1; i <= n; i++) {
16            sum += i;
17        }
18        printf("S = %d\n", sum);
19    }
20}
```



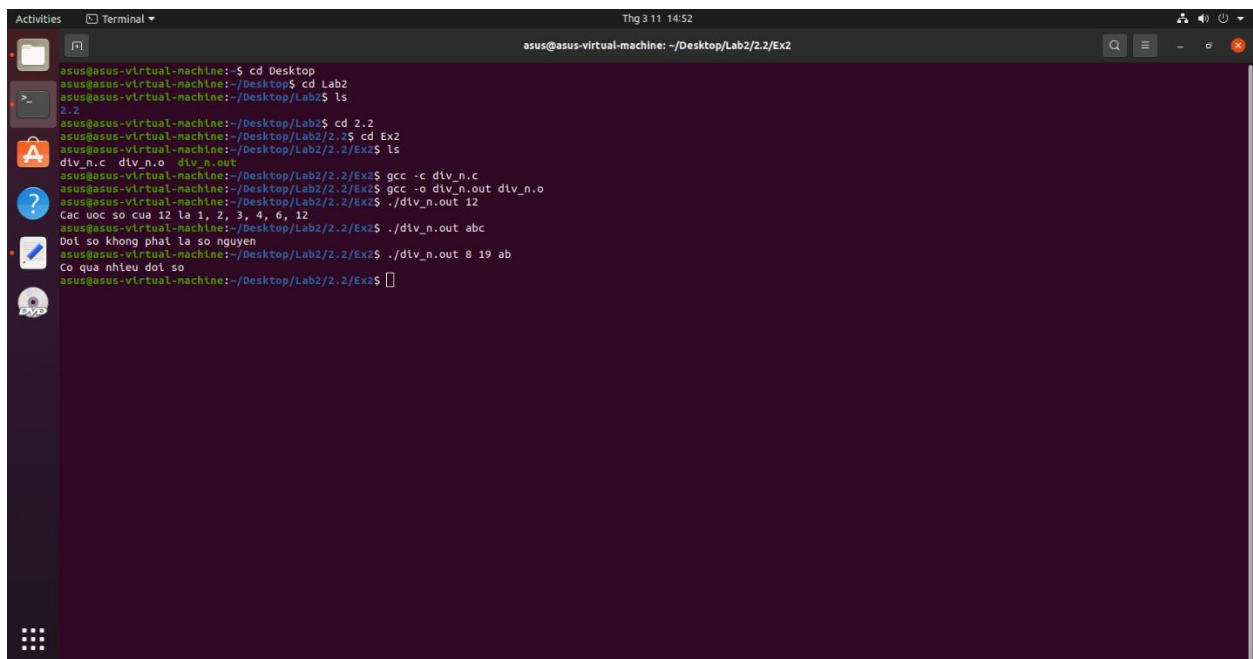
```
asus@asus-virtual-machine:~$ cd -
asus@asus-virtual-machine:~/Desktop$ cd Lab2
asus@asus-virtual-machine:~/Desktop/Lab2$ ls
sum_n.c
asus@asus-virtual-machine:~/Desktop/Lab2$ gcc -c sum_n.c
asus@asus-virtual-machine:~/Desktop/Lab2$ gcc -o sum_n.out sum_n.o
asus@asus-virtual-machine:~/Desktop/Lab2$ ./sum_n.out 8
S = 36
asus@asus-virtual-machine:~/Desktop/Lab2$ ./sum_n.out abc
Doi so khong phai la so nguyen duong
asus@asus-virtual-machine:~/Desktop/Lab2$ ./sum_n.out 8 19 ab
Co qua nhieu doi so
asus@asus-virtual-machine:~/Desktop/Lab2$
```

Bài 2:



The screenshot shows a text editor window titled 'div_n.c' with the following C code:

```
1 #include <stdio.h>
2 #include <stdlib.h>
3 #include <string.h>
4 void main(int argc, char ** argv) {
5     if (argc > 2) {
6         printf("Co qua nhieu doi so\n");
7     }
8     else if (atoi(argv[1]) == 0) {
9         printf("Doi so khong phai la so nguyen\n");
10    }
11    else {
12        int n = atoi(argv[1]);
13        int i;
14        printf("Cac uoc so cua %d la ", n);
15        for (i = 1; i <= n; i++) {
16            if (n % i == 0) {
17                if (n == i) {
18                    printf("%d\n", i);
19                }
20                else {
21                    printf("%d, ", i);
22                }
23            }
24        }
25    }
```



The screenshot shows a terminal window with the following commands and output:

```
asus@asus-virtual-machine: ~/Desktop/Lab2/2.2/Ex2
asus@asus-virtual-machine:~$ cd Desktop
asus@asus-virtual-machine:~/Desktop$ cd Lab2
asus@asus-virtual-machine:~/Desktop/Lab2$ ls
2.2
asus@asus-virtual-machine:~/Desktop/Lab2$ cd 2.2
asus@asus-virtual-machine:~/Desktop/Lab2/2.2$ cd Ex2
asus@asus-virtual-machine:~/Desktop/Lab2/2.2/Ex2$ ls
div_n.c  div_n.o  div_n.out
asus@asus-virtual-machine:~/Desktop/Lab2/2.2/Ex2$ gcc -c div_n.c
asus@asus-virtual-machine:~/Desktop/Lab2/2.2/Ex2$ gcc -o div_n.out div_n.o
asus@asus-virtual-machine:~/Desktop/Lab2/2.2/Ex2$ ./div_n.out 12
Cac uoc so cua 12 la 1, 2, 3, 4, 6, 12
asus@asus-virtual-machine:~/Desktop/Lab2/2.2/Ex2$ ./div_n.out abc
Doi so khong phai la so nguyen
asus@asus-virtual-machine:~/Desktop/Lab2/2.2/Ex2$ ./div_n.out 8 19 ab
Co qua nhieu doi so
asus@asus-virtual-machine:~/Desktop/Lab2/2.2/Ex2$
```

Bài 3:

```
Activities Text Editor Thg 3 11 22:39
~main.c ~/Desktop/Lab2/2.2/Ex3 Save

1 #include <stdio.h>
2 #include <stdlib.h>
3
4 void swap (int *a, int *b) {
5     int temp = *a;
6     *a = *b;
7     *b = temp;
8 }
9
10 void interchangeSort(int arr[], int n) {
11     int i, j;
12     for (i = 0; i < n - 1; i++) {
13         for (j = i + 1; j < n; j++) {
14             if (arr[i] > arr[j]) {
15                 swap(&arr[i], &arr[j]);
16             }
17         }
18     }
19 }
20
21 void selectionSort(int arr[], int n) {
22     int i, j;
23     for (i = 0; i < n - 1; i++) {
24         int minIndex = i;
25         for (j = i + 1; j < n; j++) {
26             if (arr[j] < arr[minIndex]) {
27                 minIndex = j;
28             }
29             swap(&arr[i], &arr[minIndex]);
30         }
31     }
32 }
33
34 void bubbleSort(int arr[], int n) {
35     int i, j;
36     for (i = 0; i < n; i++) {
37         for (j = 0; j < n - 1 - i; j++) {
38             if (arr[j] > arr[j + 1]) {
39                 swap(&arr[j], &arr[j + 1]);
40             }
41         }
42     }
43 }
44
45 void printArray(int arr[], int n) {
46     int i;
47     printf("Day tang lai: ");
48     for (i = 0; i < n; i++) {
49         printf("%d ", arr[i]);
50     }
51 }
52
53
54
55
```

```
Activities Text Editor Thg 3 11 22:39
~main.c ~/Desktop/Lab2/2.2/Ex3 Save

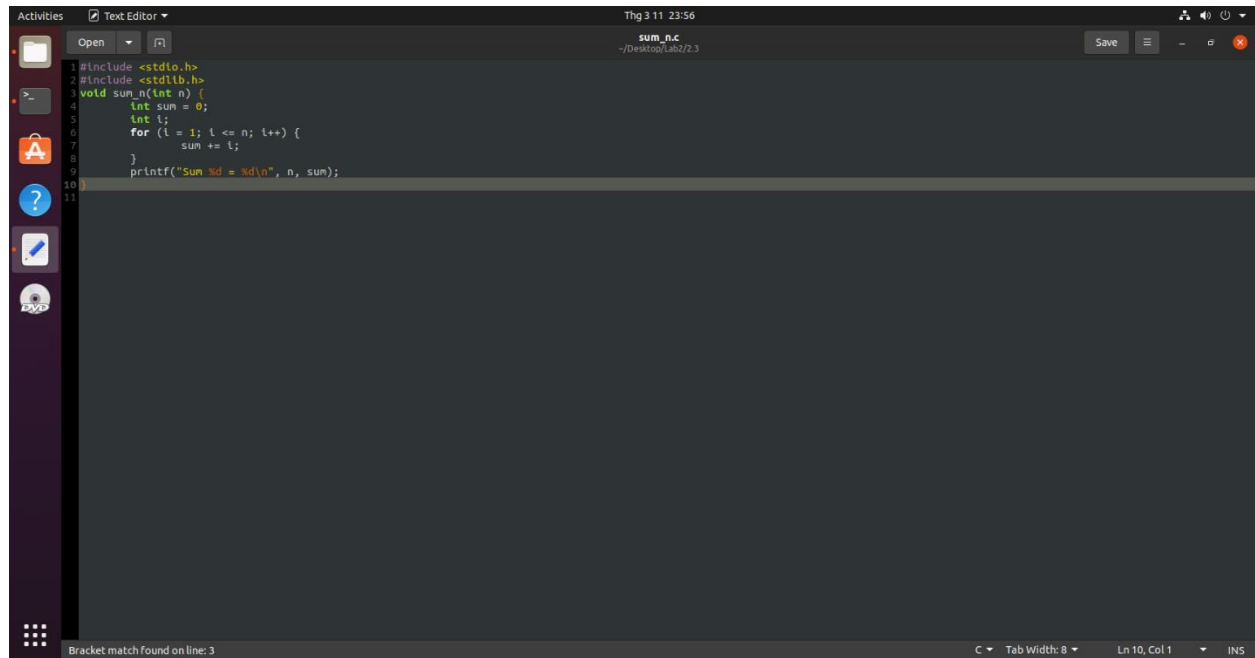
27         minIndex = j;
28         swap(&arr[i], &arr[minIndex]);
29     }
30 }
31 }
32 }
33
34 void bubbleSort(int arr[], int n) {
35     int i, j;
36     for (i = 0; i < n; i++) {
37         for (j = 0; j < n - 1 - i; j++) {
38             if (arr[j] > arr[j + 1]) {
39                 swap(&arr[j], &arr[j + 1]);
40             }
41         }
42     }
43 }
44
45 void printArray(int arr[], int n) {
46     int i;
47     printf("Day tang lai: ");
48     for (i = 0; i < n; i++) {
49         printf("%d ", arr[i]);
50     }
51 }
52
53
54
55
56 void main(int argc, char ** argv) {
57     int i;
58     int count = 0;
59     for (i = 0; i < argc; i++) {
60         if (atoi(argv[i]) != 0) {
61             count++;
62         }
63     }
64     int n = count;
65     int arr[n];
66     int j, k = 0;
67     for (j = 0; j < argc; j++) {
68         if (atoi(argv[j]) != 0) {
69             arr[k] = atoi(argv[j]);
70             k++;
71         }
72         else {
73             continue;
74         }
75     }
76     //interchangeSort(arr, n);
77     //selectionSort(arr, n);
78     bubbleSort(arr, n);
79     printArray(arr, n);
80     printf("\n");
81 }
```

```
Activities Terminal Thg 3/11 22:40
asus@asus-virtual-machine: ~/Desktop/Lab2/2.2/Ex3

asus@asus-virtual-machine:~$ pwd
/home/asus
asus@asus-virtual-machine:~$ cd Desktop
asus@asus-virtual-machine:~/Desktop$ cd Lab2
asus@asus-virtual-machine:~/Desktop/Lab2$ cd 2.2
asus@asus-virtual-machine:~/Desktop/Lab2/2.2$ cd Ex3
asus@asus-virtual-machine:~/Desktop/Lab2/2.2/Ex3$ ls
main.c  main.o  main.out
asus@asus-virtual-machine:~/Desktop/Lab2/2.2/Ex3$ gcc -o main.out main.o
asus@asus-virtual-machine:~/Desktop/Lab2/2.2/Ex3$ gcc -c main.c
asus@asus-virtual-machine:~/Desktop/Lab2/2.2/Ex3$ gcc -o main.out main.o
asus@asus-virtual-machine:~/Desktop/Lab2/2.2/Ex3$ ./main.out 8 3 1 ab -12
Day tang la: -12 1 3 8
asus@asus-virtual-machine:~/Desktop/Lab2/2.2/Ex3$ gcc -c main.c
asus@asus-virtual-machine:~/Desktop/Lab2/2.2/Ex3$ gcc -o main.out main.o
asus@asus-virtual-machine:~/Desktop/Lab2/2.2/Ex3$ ./main.out 8 3 1 ab -12
Day tang la: -12 1 3 8
asus@asus-virtual-machine:~/Desktop/Lab2/2.2/Ex3$ gcc -c main.c
asus@asus-virtual-machine:~/Desktop/Lab2/2.2/Ex3$ gcc -o main.out main.o
asus@asus-virtual-machine:~/Desktop/Lab2/2.2/Ex3$ ./main.out 8 3 1 ab -12
Day tang la: -12 1 3 8
asus@asus-virtual-machine:~/Desktop/Lab2/2.2/Ex3$
```

2.3 - Liên kết tĩnh và liên kết động

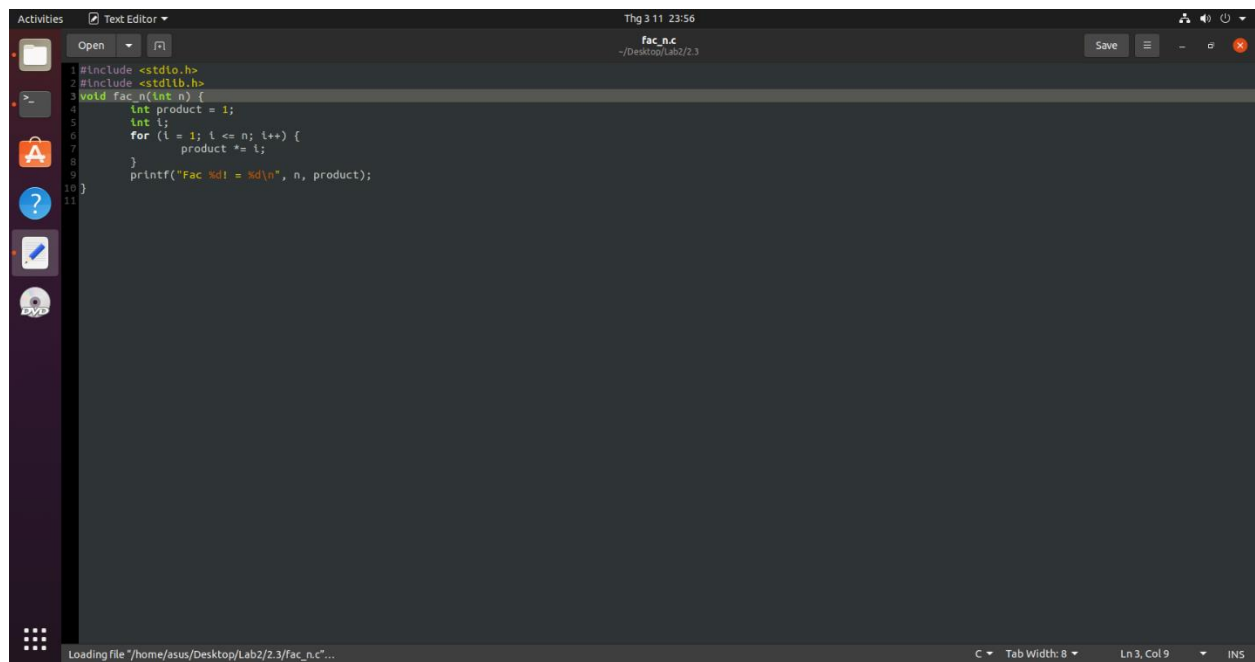
Bài 1:



A screenshot of a text editor window titled "sum_n.c" located at "~/Desktop/Lab2/2.3". The editor shows the following C code:

```
1 #include <stdio.h>
2 #include <stdlib.h>
3 void sum_n(int n) {
4     int sum = 0;
5     int i;
6     for (i = 1; i <= n; i++) {
7         sum += i;
8     }
9     printf("Sum %d = %d\n", n, sum);
10 }
11
```

The status bar at the bottom indicates "Bracket match found on line: 3" and "Ln 10, Col 1".



A screenshot of a text editor window titled "fac_n.c" located at "~/Desktop/Lab2/2.3". The editor shows the following C code:

```
1 #include <stdio.h>
2 #include <stdlib.h>
3 void fac_n(int n) {
4     int product = 1;
5     int i;
6     for (i = 1; i <= n; i++) {
7         product *= i;
8     }
9     printf("Fac %d! = %d\n", n, product);
10 }
11
```

The status bar at the bottom indicates "Loading file "/home/asus/Desktop/Lab2/2.3/fac_n.c"..." and "Ln 3, Col 9".

Activities Text Editor Thg 3 11 23:55

div_n.c
~/Desktop/Lab2/2.3

```
1 #include <stdio.h>
2 #include <stdlib.h>
3 #include <string.h>
4 void div_n(int n) {
5     int i;
6     printf("Divisor %d = ", n);
7     for (i = 1; i <= n; i++) {
8         if (n % i == 0) {
9             if (n == i) {
10                printf("%d\n", i);
11            }
12            else printf("%d, ", i);
13        }
14    }
15 }
16 }
```

Bracket match found on line: 4

C Tab Width: 8 Ln 4, Col 11 INS

Activities Text Editor Thg 3 11 23:55

Ex3_1.c
~/Desktop/Lab2/2.3/Ex3_1.c

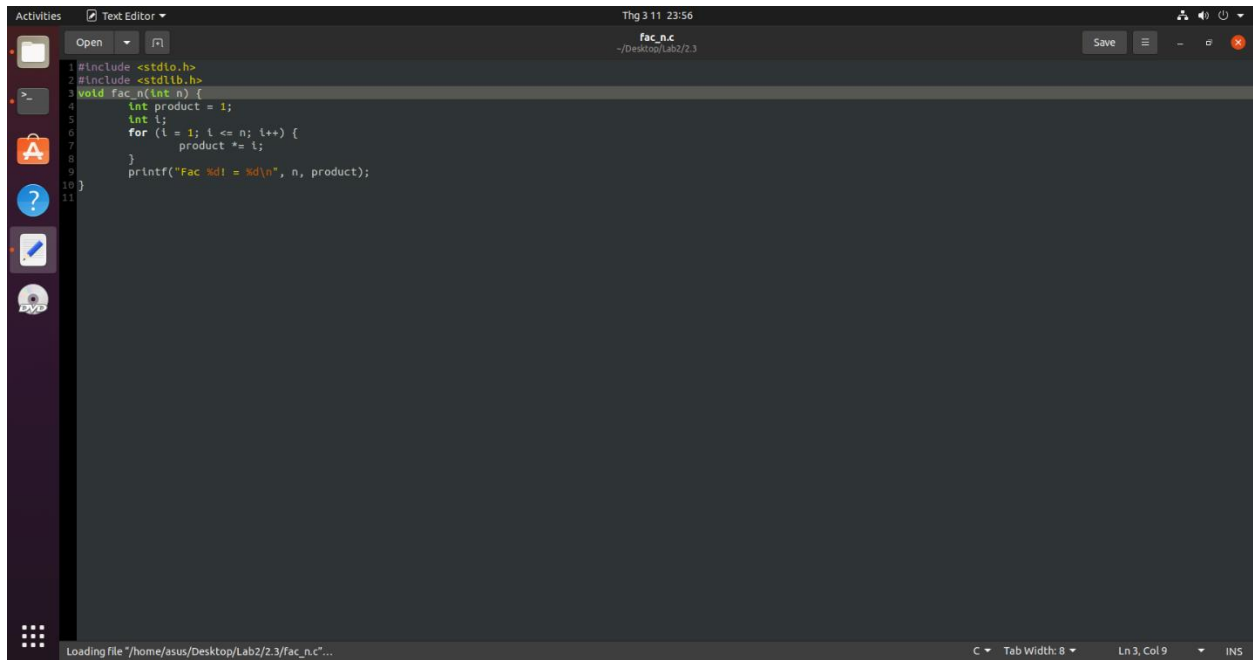
```
1 #include <stdio.h>
2 #include <stdlib.h>
3
4 void main(int argc, char ** argv) {
5     sum_n(atol(argv[3]));
6     fac_n(atol(argv[2]));
7     div_n(atol(argv[1]));
8 }
```

Loading file "/home/asus/Desktop/Lab2/2.3/Ex3_1.c"...

C Tab Width: 8 Ln 5, Col 9 INS

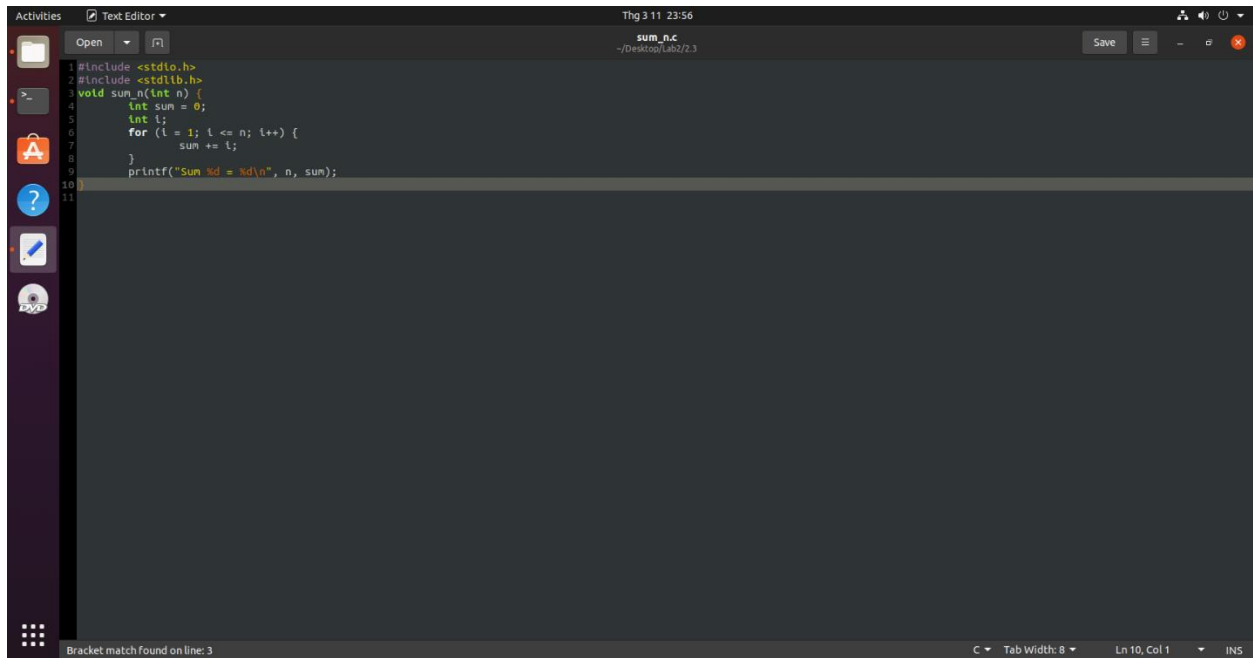
```
Activities Terminal Thg 3 11 23:55
asus@asus-virtual-machine: ~/Desktop/Lab2/2.3
asus@asus-virtual-machine:~$ pwd
/home/asus
asus@asus-virtual-machine:~$ cd Desktop
asus@asus-virtual-machine:~/Desktop$ cd Lab2
asus@asus-virtual-machine:~/Desktop/Lab2$ cd 2.3
asus@asus-virtual-machine:~/Desktop/Lab2/2.3$ ls
div_n.c div_n.o Ex3_1.c Ex3_1.o fac_n.c fac_n.o libh1.a sum_n.c sum_n.o
asus@asus-virtual-machine:~/Desktop/Lab2/2.3$ gcc -c div_n.c fac_n.c sum_n.c
asus@asus-virtual-machine:~/Desktop/Lab2/2.3$ ar cr libh1.a div_n.o fac_n.o sum_n.o
asus@asus-virtual-machine:~/Desktop/Lab2/2.3$ gcc -o Ex3_1.out Ex3_1.o libh1.a
asus@asus-virtual-machine:~/Desktop/Lab2/2.3$ ./Ex3_1.out 2 3 4
Sum 2 = 3
Fac 3! = 6
Divisor 4 = 1, 2, 4
asus@asus-virtual-machine:~/Desktop/Lab2/2.3$
```

Bài 2:



```
1 #include <stdio.h>
2 #include <stdlib.h>
3 void fac_n(int n) {
4     int product = 1;
5     int i;
6     for (i = 1; i <= n; i++) {
7         product *= i;
8     }
9     printf("Fac %d! = %d\n", n, product);
10 }
11
```

Loading file "/home/asus/Desktop/Lab2/2.3/fac_n.c"...



```
1 #include <stdio.h>
2 #include <stdlib.h>
3 void sum_n(int n) {
4     int sum = 0;
5     int i;
6     for (i = 1; i <= n; i++) {
7         sum += i;
8     }
9     printf("Sum %d = %d\n", n, sum);
10 }
11
```

Bracket match found on line: 3

Activities Text Editor Thg 3 11 23:55

div_n.c
~/Desktop/Lab2/2.3

```
1 #include <stdio.h>
2 #include <stdlib.h>
3 #include <string.h>
4 void div_n(int n) {
5     int i;
6     printf("Divisor %d = ", n);
7     for (i = 1; i <= n; i++) {
8         if (n % i == 0) {
9             if (n == i) {
10                printf("%d\n", i);
11            }
12            else printf("%d, ", i);
13        }
14    }
15 }
16 }
```

Bracket match found on line: 4

C Tab Width: 8 Ln 4, Col 11 INS

Activities Text Editor Thg 3 12 00:06

Ex3_2.c
~/Desktop/Lab2/2.3

```
1 #include <stdio.h>
2 #include <stdlib.h>
3
4 void main(int argc, char ** argv) {
5     sum_n(atol(argv[1]));
6     fac_n(atol(argv[2]));
7     div_n(atol(argv[3]));
8 }
```

Bracket match found on line: 4

C Tab Width: 8 Ln 8, Col 2 INS

```
Activities Terminal Thg 3 12 09:11
asus@asus-virtual-machine: ~/Desktop/Lab2/2.3
asus@asus-virtual-machine:~$ cd Desktop
asus@asus-virtual-machine:~/Desktop$ cd Lab2
asus@asus-virtual-machine:~/Desktop/Lab2$ ls
2.2 2.3
asus@asus-virtual-machine:~/Desktop/Lab2$ cd 2.3
asus@asus-virtual-machine:~/Desktop/Lab2/2.3$ ls
div_n.c Ex3_1.c Ex3_1.out Ex3_2.o fac_n.c libd1.a sum_n.c
div_n.o Ex3_1.o Ex3_2.c Ex3_2.out fac_n.o libd1.a sum_n.o
asus@asus-virtual-machine:~/Desktop/Lab2/2.3$ gcc -c -fPIC div_n.c sum_n.c fac_n.c
asus@asus-virtual-machine:~/Desktop/Lab2/2.3$ gcc -shared -fPIC -o libd1.a div_n.o sum_n.o fac_n.o
asus@asus-virtual-machine:~/Desktop/Lab2/2.3$ sudo cp libd1.a /lib
[sudo] password for asus:
asus@asus-virtual-machine:~/Desktop/Lab2/2.3$ gcc -c Ex3_2.c
Ex3_2.c: In function 'main':
Ex3_2.c:5:2: warning: implicit declaration of function 'sum_n' [-Wimplicit-function-declaration]
5 |   sum_n(atoi(argv[1]));
  |   ^~~~~
Ex3_2.c:6:2: warning: implicit declaration of function 'fac_n' [-Wimplicit-function-declaration]
6 |   fac_n(atoi(argv[2]));
  |   ^~~~~
Ex3_2.c:7:2: warning: implicit declaration of function 'div_n'; did you mean 'div'? [-Wimplicit-function-declaration]
7 |   div_n(atoi(argv[3]));
  |   ^~~~~
  |   div
asus@asus-virtual-machine:~/Desktop/Lab2/2.3$ gcc -o Ex3_2.out Ex3_2.o libd1.a
asus@asus-virtual-machine:~/Desktop/Lab2/2.3$ ./Ex3_2.out 2 3 4
Sum 2 = 3
Fac 3! = 6
Divisor 4 = 1, 2, 4
asus@asus-virtual-machine:~/Desktop/Lab2/2.3$
```